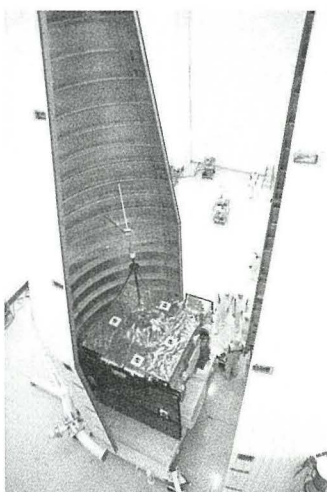




Fortieth Anniversary  
*Pioneering the Future*

## Preparing GOES to go



At Astrotech in Titusville, Fla., the GOES-L weather satellite was encapsulated in its fairing before transfer to Launch Pad 36B at Cape Canaveral Air Station.

The fourth of a new advanced series of geostationary weather satellites for the National Oceanic and Atmospheric Administration (NOAA), GOES-L is a three-axis inertially stabilized spacecraft that will provide pictures and perform atmospheric sounding at the same time.

After launch, the satellite will undergo checkout and then provide backup capabilities for existing, aging operational satellites.

Once in orbit, the satellite will become GOES-11 — joining GOES-8, GOES-9 and GOES-10 in space. GOES will be launched aboard a Lockheed Martin Atlas II rocket.

KSC is the lead center for acquisition and management of Expendable Launch Vehicle (ELV) launch services.

May 14, 1999

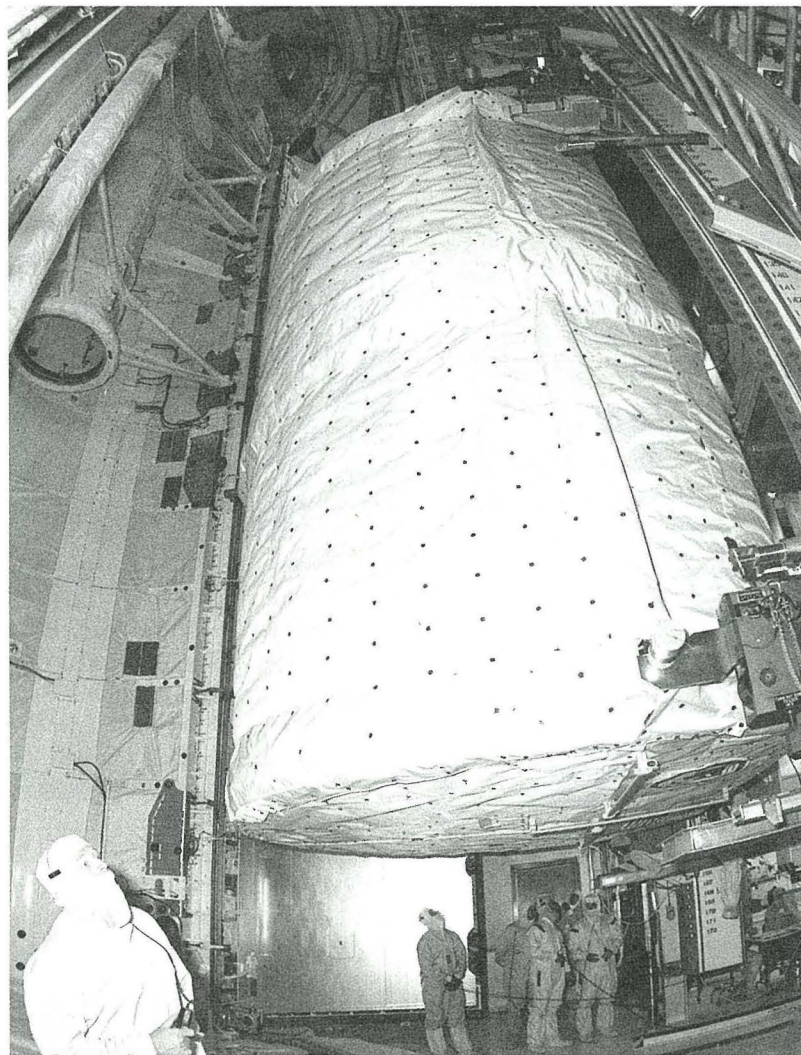
Vol. 38, No. 10

# Spaceport News

*America's gateway to the universe. Leading the world in preparing and launching missions to Earth and beyond.*

John F. Kennedy Space Center

## Packing up for a trip to the space station



Packing light isn't an option for the seven-member crew of STS-96, scheduled to lift off to the International Space Station (ISS) on May 20 from Kennedy Space Center's Launch Pad 39B.

The 10-day flight will take about two tons of supplies — including laptop computers, a printer, cameras, maintenance tools, spare parts and clothing — to the orbiting space station in the SPACEHAB double module.

Discovery will be the first orbiter to dock with the fledgling station since the crew of Endeavour departed the outpost in December 1998.

STS-96 will also be the first logistics flight to the new station.

Discovery will spend five days linked to the ISS, transferring and installing gear that could not be

**(See STS-96, Page 5)**

At left, In the payload changeout room at Launch Pad 39B, technicians moved the SPACEHAB double module from the payload canister on April 28 and placed it in Space Shuttle Discovery's payload bay for STS-96. The second flight for construction of the International Space Station, STS-96 is a logistics and supply mission. Liftoff is scheduled for May 20 at 9:32 a.m. EDT.

## Readying the station to break new ground

When the International Space Station (ISS) is inhabited by its first crew early next year, continuous, long-term microgravity research will commence aboard the Earth-orbiting outpost.

That research will undoubtedly provide unexpected results in the fields of material science, biotechnology, fluid physics, and combustion and life sciences.

While such unanticipated findings are exciting to scientists and researchers, unforeseen occurrences in space are an engineer's nightmare.

To assure optimum performance of the ISS's U.S. Laboratory

(officially named Destiny) in space, where orbiting crews and Earth-bound researchers will conduct their experiments, a team of NASA and Boeing engineers and technicians are now hard at work on the ground.

Almost one year before launch of Destiny on STS-98, the team has been gathering and analyzing data from the laboratory's first closed-hatch qualification test.

"We've run all environmental control and life support systems on the ground to qualify that the systems will function as we expect them to in space," said Randy Galloway, NASA technical lead for

the ISS's 5A flight.

Functioning as it would in space means simulating a human presence operating inside the laboratory. "We introduced heat into the cabin, as well as moisture and carbon dioxide to simulate the presence of the crew," Galloway noted. "This way, we can assure that proper life support systems will function as required for actual crew members on orbit."

Four major systems were qualified fit for orbital operation during the eight-day test of Destiny, which had its hatch closed for the

**(See Destiny, Page 2)**



## Laboratory ...

(Continued from Page 1)

test's duration on April 29.

"One of the systems we needed to qualify was the lab's atmosphere revitalization system, which assures that carbon dioxide will be removed as expected," said Boeing Senior Test Engineer Emile Sendral.

"This same test will also check the major constituent analyzer, or MCA. That essentially samples and analyzes atmospheric conditions not only for the U.S. Laboratory, but also for conditions throughout the station," Sendral noted.

Since the laboratory is not physically attached right now to the ISS, the test of conditions throughout the station was achieved through laboratory interfaces.

"We've also run a test of the

atmosphere revitalization system to check how its trace contaminant control system is operating," Sendral continued. "This system checks for and removes undesirable elements in the air."

Another system checked in the eight-day trial was the atmosphere control supply system.

"This system primarily simulates the atmosphere on the ground," stated NASA's lead engineer on the closed-hatch test, Gary Wentz.

"This system provides partial pressure of oxygen and nitrogen."

The third test run on the lab was qualifying the functionality of the temperature humidity control system.

"Basically, this system monitors and controls the lower and upper temperatures in the lab, much like your thermostat at home," noted Wentz.

And finally, the thermal control



Gary Wentz, left, and Emile Sendral work together on Destiny's closed-hatch test.

system was checked during the week-long qualifying test.

"The thermal control system removes heat from the electronics to allow them to function optimally," said Sendral.

"It also supports humidity control, like the evaporator coil in an air conditioning unit on Earth. During the test, we demonstrated its ability to collect the condensation in the lab and dump it overboard."

All of these systems are vital to supporting scientists, engineers and entrepreneurs on an unprecedented platform on which to perform complex, long-duration and replicable experiments in the unique environment of space.

The microgravity of space has become an important tool for scientists developing highly sophisticated materials and processes for use now and in the 21st century.

The station will maximize its particular assets — prolonged exposure to microgravity and the presence of human experimenters in the research process.

As an international crew of astronauts live and work together in

space, the ISS community will expand here on Earth as researchers use the technologies of "tele-science" to control and manipulate experiments from the ground.

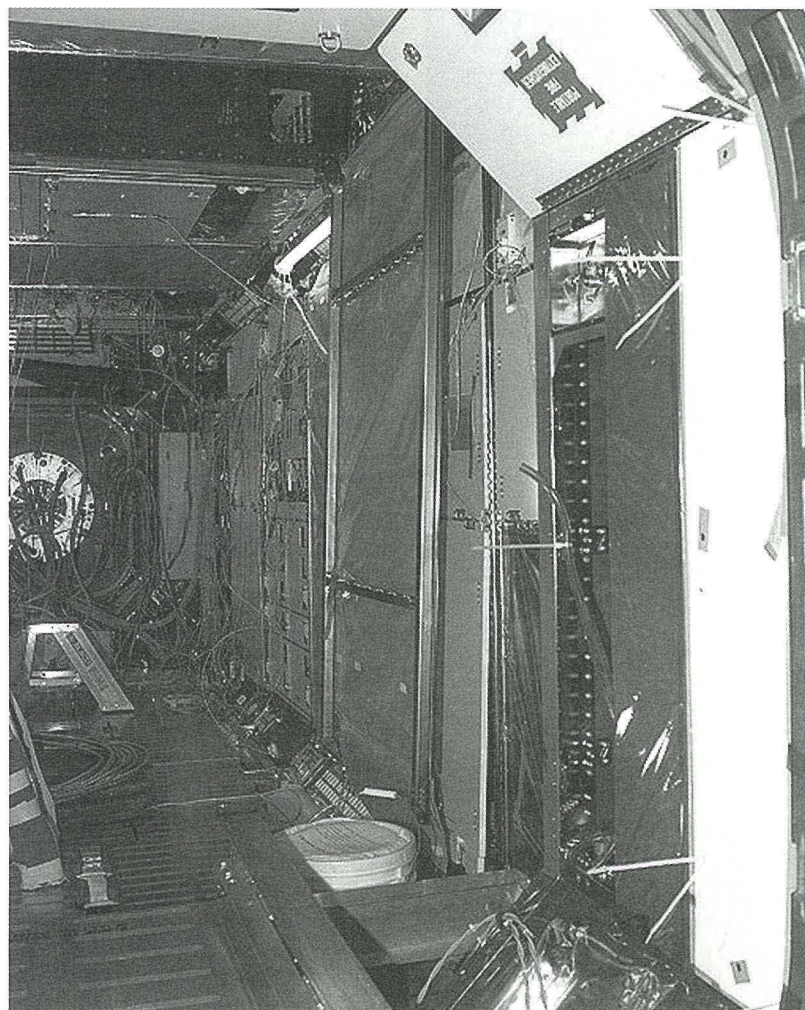
Advancing communications and information technologies will allow Earth-bound investigators to enjoy a "virtual presence" on board the ISS as they take their place in a world community that will use and benefit from an orbiting laboratory.

The ISS will execute concurrent roles as:

- an advanced testbed for technology and human exploration;
- a world-class research facility; and
- a commercial platform for space research and development.

Since the Skylab space station in 1973 and through the Space Shuttle and Spacelab missions, NASA has sponsored a long line of microgravity materials research.

It will continue in the 21st century as the International Space Station is assembled and becomes a major research facility, including the U.S. Laboratory Module, with facilities for research in biotechnology, fluid physics, combustion and life sciences.



Before Destiny's hatch was closed on April 29 for an eight-day qualification test, this inside view of the "floor" racks was taken. The "floor" refers to its on-orbit orientation (for human factors considerations, a floor/ceiling relationship is maintained). In this picture, the racks are "on the wall," as evident by the step ladders (at left) in the picture. The condensing heat exchanger that removes the water from the atmosphere is positioned (far right in the photo) so that the heat exchanger is "on its back" to allow the water to drain into a separator in 1 g. On orbit, this process uses airflow and suction to work properly. The condensing heat exchanger and water separator are very similar to the hardware used on the Space Shuttle today.



## Roe named manager, Space Shuttle Vehicle Engineering Office



Ralph Roe

Ralph R. Roe Jr. has been named manager, Space Shuttle Vehicle Engineering Office in the Space Shuttle Program at Johnson Space Center, Houston.

In this position, Roe will direct the design, development, production and testing of orbiters, associated government-furnished equipment, the remote manipulator system, software, avionics and flight crew equipment. Roe will take the position after the STS-96 launch.

"It has been an honor to be a member of the KSC team, and this is a great opportunity for me to share the operational experience I've gained at KSC with the rest of the Shuttle Program," he said.

Roe is currently launch director for KSC Shuttle launches. A successor launch director has yet to be named.

Formerly, Roe served as director, Process Engineering Directorate; chief, Fluid Systems Division; and chief, Environmental Control, Hypergolic and Hydraulic Systems Branch in the Vehicle Engineering Directorate at KSC. He joined NASA at KSC in 1983 and served in several senior technical and managerial positions.

Roe earned a bachelor of science degree in mechanical engineering from the University of South Carolina in 1983 and his master's of science degree in engineering management from the University of Central Florida in 1992.

## Joint Communications Control Center Becomes Operational

The Joint Communications Control Center (JCCC) located at KSC, with an alternate site at Cape Canaveral Air Station (CCAS), formally began operations April 6 following a ribbon-cutting ceremony.

The JCCC combines the communications control mission of CCAS with the same operation at KSC.

The latest technological advances in electronic communications monitoring and dispatch systems are now integrated into one center.

Also taking part in this event were approximately 100 individuals who participated in the successful completion of this project.

Hickman and Deputy Program Manager Chuck Debelius hailed the Joint Communications Control Center as a grand achievement

and a credit to all the men and women who contributed to the team effort.

The primary center is located in Room 1P10 of KSC's Launch Control Complex, with an alternate center located at Building 49750 at Cape Canaveral Air Station.

The Joint Communications Control Center is staffed 24 hours a day, seven days a week.

The center provides continuous communication support for Fire/EMS and Security personnel; electronic assessment of fire and security alarm systems; 911 emergency call responses, including telephone devices for the deaf; aural public address; and adverse weather warning systems.

There are more than 98,000 combined devices (fire alarms, smoke and motion detectors, etc.) that are the responsibility of SGS on both KSC and Cape Canaveral Air Station.

The equipment, operated by

Research Planning, Inc. (an SGS subcontractor), controls a myriad of functions for hundreds of buildings at both locations.

These functions include closed circuit television cameras, two-way radio networks, infrared detection systems, motion detectors, intrusion alarm signals, fiber-optic motion sensors, computerized response and dispatch systems and electronic access control systems.

A protection systems team of 25 electronics experts maintains these devices.

The Joint Communications Control Center fulfills the concept of the J-BOSC by integrating two collateral emergency response functions into one advanced communication control center — providing faster, better service at a cost savings.

## Being an ACE at attention to detail, Meeks wins award

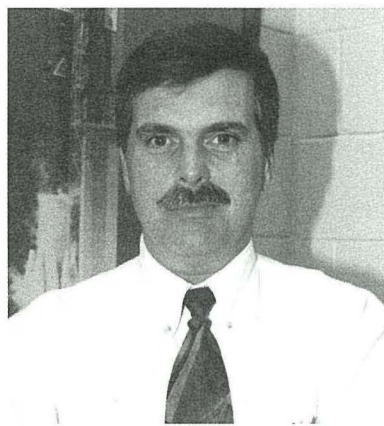
by Susan Hubscher

Proving that paying attention to details is important, KSC integration engineer Sam Meeks was given the QASAR award for finding a broken wire in a Delta II engine.

Then a mechanical and propulsion engineer, Meeks found the damage during the final Delta second stage engine section walk-down for the Advanced Composition Explorer (ACE) mission in August 1997.

He found the broken wire in the Redundant Attitude Control System module. The wire is necessary to provide critical firing sequencing to the Redundant Attitude Control System for second stage attitude control. Because of Meek's finding, Boeing initiated an investigation to verify that all electrical cables were in their proper position.

The sequencing of the cables was verified with the vehicle second stage drawings, the cable was



Sam Meeks

repaired and the Redundant Attitude Control System module was closed out for flight.

If the broken wire had not been found and if the cables were in an improper position, the Delta's second stage would not have fired in the correct order to control the stage, and the satellite would have been lost.

For pointing out the discovery, Meeks was presented with the Quality and Safety Achievement

Recognition (QASAR) Award on April 22 at the 14th Annual NASA Continual Improvement and Reinvention Conference at the Hilton Alexandria Mark Center, in Alexandria, Va.

The QASAR award is given by NASA's Safety and Mission Assurance Directorate to employees who demonstrate exemplary performance in contributing to quality products and/or services to the agency.

Meeks was also nominated for the "Best of the Best" QASAR award.

Each center nominates local QASAR award recipients to be considered for this agencywide award.

Meeks has worked in the Expendable Launch Vehicle Directorate since 1994.

During this time, he has contributed to the success of the Mechanical and Propulsion Branch through his professionalism and teamwork.



## Buckle up for safety's sake



Crash test dummies, seen above in this photo taken during KSC's 1998 Super Safety Day, remind everyone to wear seat belts on and off KSC property. Last year's dummies were John Moreland, Boeing, and Julie Shally, NASA. This year, Super Safety and Health Day is scheduled for Thursday, June 17. It will be a stand-down from work day when all KSC employees will make time to focus on safety and health issues.

## CCTS honors Kennedy Space Center staff at Space Congress

James Jennings, KSC deputy director for Business Operations, and John Williams, staff engineer and pollution prevention coordinator for United Space Alliance, were honored April 29 at the 36th Space Congress' banquet for significant long-term achievements to local defense and aerospace efforts during the past five years.

Jennings received the Space Congress Achievement Award for his managerial contributions to the defense and aerospace effort.

With more than 32 years' experience with NASA and the aerospace community, Jennings has been instrumental in implementing strategic plans that have improved business practices at Kennedy Space Center.

Jennings created the KSC Strategic Business Council, which has successfully integrated all business planning efforts. He led the implementation of the KSC Goal Performance Evaluation System, resulting in significant improvements that have since been emulated by other NASA centers.

Williams accepted the Space Congress Technical Achievement Award for technical achievement in

defense and aerospace.

Williams is accomplished in reducing hazardous waste from Space Shuttle operations.

These procedures result in safer operations, decreased environmental compliance risks and significant cost savings.

These processes also minimize and in some cases eliminate employee exposure to hazardous materials.

The Canaveral Council of Technical Societies (CCTS), which sponsors Space Congress, also awarded Rick Abramson, general chairman of the 36th Space Congress, with the Appreciation Award for his commitment to Space Congress, and to the Space Congress committee, volunteers and other workers.

Abramson was recognized for initiating many innovative features this year, such as having all the events in one location and providing students free access to all sessions and the Meet the Astronauts session.

These awards are given annually at the Space Congress banquet to recognize superior achievements of outstanding managers, supervisors and other local businessmen.

## "Countdown to the millennium"

"Countdown to the millennium is a phrase bound to become a familiar one in coming months," said Rick Abramson, general chairman of the recent 36th Space Congress and president and CEO of Delaware North Parks Services, Inc. "Perhaps nowhere is the dawn of a new age felt more strongly than in the space industry."

This theme was reflected throughout the four days of the 36th annual Space Congress, held April 27-30 at the Radisson at the Port in Port Canaveral.

The event included paper and panel sessions, exhibits, banquets and receptions, but an additional emphasis was placed this year on student outreach.

"Today's students will be among those who shape the space program of the new millennium," Abramson said.

Space Congress is sponsored by the Canaveral Council of Technical Societies, a group represented by members of 33 professional and technical societies and advisory groups.



Don McMonagle, manager, Space Shuttle Program Launch Integration, signed autographs for young fans at the 36th annual Space Congress. McMonagle flew as a mission specialist on STS-39, a pilot on STS-54 and a commander on STS-66.

## May employees of the month



Employees of the month for May include, from left to right, Adrienne Ulmer, Space Shuttle Program Launch Integration; Nancy Hoffman, Office of the Chief Financial Officer; Sheila Perry, Installation Operations; Jimmie Rogers, Safety and Mission Assurance; Melanie Chan, Engineering Development; Julie Hallum, Administration Office; and Donna Rafferty, Procurement Office. Not shown are Cristina Guidi, Advanced Development and Shuttle Upgrades; Terry Ross, Checkout and Launch Control System Office; Rodney Berwanger, Logistic Operations; William Scheafer, Space Station and Shuttle Payloads; Stephen Payne, Shuttle Processing; Greg Meeks, Space Station Hardware Integration Office; and Wendy Johnson, ELV and Payload Carriers Program Office.



## STS-96 ...

(Continued from Page 1)

launched aboard earlier flights due to weight limitations.

Discovery's mission sets the stage for the arrival of the first station living quarters, the Russian-provided Service Module, scheduled to be launched by Russia later this year.

Navy Commander Kent Rominger will command Discovery's crew, which includes cosmonaut Valery Tokarev, a colonel in the Russian Air Force, and Canadian astronaut Julie Payette as mission specialists.

Rick Husband will serve as pilot of Discovery, and a space walk will be performed by astronauts Tammy Jernigan and Daniel Barry, while Discovery is docked to the station.

Jernigan and Barry will attach a U.S. space walkers' crane to the exterior that will assist in future assembly activities.

"I think the building of the International Space Station is certainly an ambitious project ... and we're doing it one piece at a time," said Jernigan, "so we have to be very clever about the testing that we do and the training that we do.

"Each mission builds upon the

other," she added, "and we're one important piece, but small piece, of a very, very large puzzle."

Parts of a Russian crane also will be attached. That crane, known as Strela, will be mounted on Pressurized Mating Adapter 2.

Mission Specialist Ellen Ochoa, a two-time Shuttle veteran, rounds out Discovery's crew as flight engineer and a mission specialist.

Ochoa will operate the Shuttle's mechanical arm from inside the cabin during the space walk.

In addition to its primary cargo of station supplies and equipment, Discovery will carry aloft a small satellite called Starshine

that will provide educational observations for students around the world studying orbital mechanics and aerospace.

Another test aboard

Discovery will

explore the use of new equipment, called the Volatile Removal Assembly, that may one day be used for recycling water aboard the space station.

Two new sets of sensing systems will be studied on the mission.

A set of sensors called the Shuttle Vibration Forces (SVF) experiment will record the vibrations experienced between the

orbiter and its cargo.

The experiment will be activated automatically by the orbiter's lift-off vibration and will operate for approximately 100 seconds.

Also, a set of sensors and avionics equipment called the Integrated Vehicle Health Monitoring (IVHM) system will record the performance of various onboard Shuttle systems.

The objective of the Integrated Vehicle Health Management system is to reduce planned ground processing, streamline problem trouble-shooting and improve overall vehicle safety.

The KSC-developed IVHM system is one of several ongoing studies using new technologies to improve Shuttle operations.

Discovery is scheduled to land at Kennedy Space Center on May 30.

Following Discovery's flight, Atlantis is scheduled to next visit the station in December, after the uncrewed Russian Service Module has docked automatically with the International Space Station.

The station is now in an orbit with a high point of 252 statute miles and a low point of 238 statute miles, circling the Earth approximately once every 92 minutes.

The 35-ton complex has completed more than 2,600 orbits of Earth since its launch and is easily visible from the ground as it passes overhead at dawn or dusk.

It will become even brighter once Discovery has docked.

International Space Station viewing opportunities for locations worldwide are available on the Internet at <http://spaceflight.nasa.gov/realdatasightings/>



Israeli astronauts Itzhak Mayo (left) and Ilan Ramon, with the Israeli Space Agency, stopped at Launch Pad 39B during their tour of KSC on May 3. They are now training at Johnson Space Center in Houston for an upcoming Space Shuttle mission with a payload that includes a multispectral camera for recording desert aerosol (particles of dust whipped up by desert storms) to try to determine how they affect global climate change. Ramon is Israel's first astronaut, and Mayo is training as Ramon's back-up.



The STS-96 crew take a photo break during Terminal Countdown Demonstration Test (TCDT) activities at KSC's Launch Pad 39B on April 28. From left, they are Mission Specialists Valery Ivanovich Tokarev with the Russian Space Agency, Daniel Barry, Julie Payette (back row) with the Canadian Space Agency, Ellen Ochoa (front row), Commander Kent Rominger, Mission Specialist Tamara Jernigan and Pilot Rick Husband. The TCDT provides simulated countdown exercises, emergency egress training and opportunities to inspect the mission payloads in the orbiter's payload bay. STS-96, scheduled for liftoff on May 20 at 9:32 a.m., is a logistics and resupply mission for the International Space Station.



## Flying into the future with MEDS: the Space Shuttle's "glass cockpit"

Today's Space Shuttle, still less than one-quarter of the way through its design lifetime, is safer, more capable and less expensive to fly than ever before — thanks to enhancements from new technologies incorporated into the original orbiter design and improvements to orbiter operation.

Flights this year will be capped by a space station construction mission that will launch what is now the most sophisticated orbiter ever — Atlantis, which returned to KSC from an orbiter maintenance and down period in Palmdale, Calif., in September 1998.

Atlantis' new "glass cockpit," technically known as the Multifunction Electronic Display Subsystem (MEDS), has increased capabilities, decreased weight and power consumption and replaced obsolete equipment on the flight deck of the Shuttle.

MEDS replaced four cathode ray tube displays and 32 gauges and electromechanical displays with a total of 11 active matrix liquid crystal flat-panel, full-color displays in the Shuttle cockpit. Nine flat-panel screens are located in the forward cockpit and two in the aft cockpit.

By allowing cockpit displays to

be positioned on any screen of the pilot's choosing, MEDS provides additional backup capabilities in the event of failures than were available with mechanical cockpit displays. MEDS screens also can be changed out in-flight if necessary.

MEDS uses 90 watts less power and is 75 pounds lighter than the original displays. Color added to the original Shuttle display functions provides easier crew recognition.

All orbiters will be updated with the glass cockpit as they are periodically taken out of service for standard inspection periods, with updates to the entire fleet completed by 2002.

In addition, the annual cost of operating the Space Shuttle has decreased by almost 40 percent (when adjusted for inflation) since the early 1990s.

About a \$1.25 billion reduction has been realized in this year's budget as compared to the 1992 budget, and in the next five years, costs are projected to decrease by hundreds of millions more.

More information on Shuttle upgrades is available on the Web at <http://spaceflight.nasa.gov/upgrades>.



### "Celebrating Our Legacy"

"Celebrating our Legacy" was the theme of the fifth annual Asian & Pacific Islander American Working Group luncheon, held May 7 in KSC's Operations and Checkout Building. A special presentation of song and dance was performed by Fil-Am S.D.A.U. ensemble of Orlando (above), who enjoyed sharing the luncheon celebration with KSC employees.

## Morgan given Distinguished Executive Award

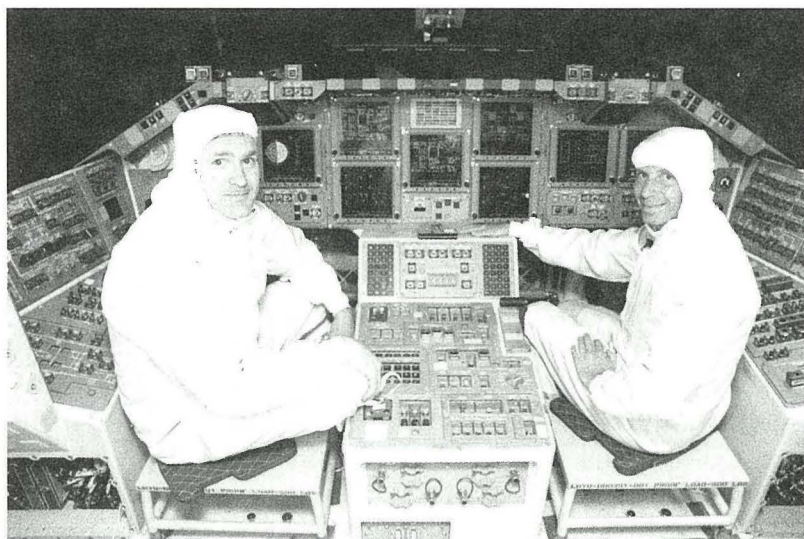
KSC Associate Director for Advanced Development and Shuttle Upgrades JoAnn Morgan was recognized as a Distinguished Executive by Vice President Al Gore on April 29 at the Presidential Distinguished Rank Awards Ceremony in Washington, D.C.

Morgan received the award for "sustained extraordinary accomplishment" in management of programs of the U.S. government and for leadership exemplifying the highest standards of service to the public, reflecting credit on the career civil service.

The Distinguished Executive rank Award is the nation's highest civil service award.

The awards ceremony is hosted by the Senior Executives Association, whose mission is to improve the efficiency, effectiveness and productivity of the federal government.

The award, presented to fewer than one percent of career senior executive staff members of the U.S. government, includes a monetary award, a gold pin and a framed certificate signed by the U.S. president.



STS-101 Commander James Halsell (left) and STS-98 Commander Ken Cockrell (right) pause for a photo while looking over the recently installed Multifunction Electronic Display Subsystem (MEDS) in the cockpit of the orbiter Atlantis. The new full-color, flat panel MEDS improves crew/orbiter interaction with easy-to-read, graphic portrayals of key flight indicators like attitude display and mach speed. The installation makes Atlantis the most modern orbiter in the fleet and equals the systems on current commercial jet airliners and military aircraft. The first flight of the upgraded Atlantis will be STS-101, scheduled for launch in December 1999, and its second flight, STS-98, is scheduled for launch in April 2000.



John F. Kennedy Space Center

## Spaceport News

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